

NON-PUBLIC?: N  
ACCESSION #: 8906140205  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Millstone Nuclear Power Station Unit 3 PAGE: 1 of 4

DOCKET NUMBER: 05000423

TITLE: Manual Reactor Trip Due to Imminent Loss of Condenser Vacuum  
EVENT DATE: 05/06/89 LER #: 89-008-00 REPORT DATE: 06/05/89

OPERATING MODE: 1 POWER LEVEL: 90

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: Barrett W. Nichols, Engineer Ext 5493 TELEPHONE: 203-447-1791

COMPONENT FAILURE DESCRIPTION:  
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:  
REPORTABLE TO NPRDS:

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On May 6, 1989 at 0810 hours, with the plant at 90% power in Mode 1, a manual reactor trip was initiated due to an anticipated turbine trip. Prior to the trip, the plant was experiencing fouling of the Traveling Screens due to large amounts of seaweed at the intake.

Root cause of this event was design deficiency in that the Traveling Screen capacity was inadequate. Recent changes to the fish return system to bring it into compliance with State Regulations have increased the seaweed loadings on all bays, especially "A" and "B" bays.

As corrective action, a procedure change has been implemented which allows for the isolation of the fish spray system when seaweed recirculation is a concern. Recommendations of an internal Task Force addressing operational problems with the Traveling Screens will be implemented over the next two years.

END OF ABSTRACT

## I. Description of Event

On May 6, 1989 at 0810 hours with the plant in Mode 1 at 90% power, a manual reactor trip was initiated due to an anticipated turbine trip. Prior to the trip, the plant was experiencing fouling of the traveling screens due to a large amount of seaweed at the intake and especially large swells. Winds at the time of the trip were from the south at 40 mph. The subsequent Turbine and Generator trips were normal responses to the Reactor trip. All safety systems were fully operable at the time of the trip.

At 0645 hours, the wind speed had peaked at 51.4 mph, as a storm front moved through the area. There was a large amount of debris in the water due to heavy rains and high winds. The traveling screens were checked by shift personnel at 0745 and found to be operating properly. Screen differential was being maintained between 10 and 14 inches water column ("w.c."), which was well below the 30" w.c. Circulating Water Pump trip setpoint. The previous shift had spent time cleaning the trash racks. There were no problems keeping up with the load. A power reduction to 90% had occurred earlier the previous evening to perform a mussel cook on the "C" and "D" condenser bays.

At 0800, the traveling screens were manually placed in high speed due to an increase in differential pressure. At 0801 hours 56 seconds, the high traveling screen differential pressure alarm annunciated, indicating that the differential pressure across the screens was above 18" w.c. The "A" and "B" condenser waterbox cross connect valves were opened in anticipation of a Circulating Water pump trip. At 0808 hours 37 seconds, the "A" Circulating Water pump automatically tripped on high Traveling Screen differential pressure. An immediate power reduction was initiated. At 0809 hours 28 seconds, the "B" Circulating water pump tripped for the same reason. Due to deteriorating plant conditions, the reactor was manually tripped at 0810 hours 7 seconds, in order to prevent unnecessary challenges to plant systems. Immediately after the trip the "C" Circulating Water pump tripped due to high differential pressure.

At the time of the trip operators verified that the Reactor Trip and Bypass Breakers were open, that all control rods were fully inserted and that neutron flux was decreasing. A Feedwater Isolation was received due to low, Average Reactor Coolant System temperature following the trip. An Auxiliary Feedwater actuation occurred as a result of a steam generator low-low level signal. These are normal plant responses following a trip. No additional Engineered Safety Features were required or initiated. The plant was stable in Mode 3 (Hot Standby) at 0813 as indicated by Average Reactor Coolant System Temperature returning to a stable value.

## II Cause of Event

Root cause of this event was design deficiency in that Traveling Screen capacity was inadequate. The abnormal environmental conditions were a contributing factor. High winds accompanied by large swells resulted in debris loadings in excess of the traveling screen removal capacity. Based on the continued ability of the onsite personnel to maintain the traveling screen differential pressure up to 0745 hours additional personnel were not deemed necessary. At the time of the trip, the storm front had passed and winds were dropping.

Over the past two months adjustments to the Fish Return System have resulted in increased seaweed loadings to the traveling screens. These changes were mandated by the State of Connecticut to satisfy commitments made by Millstone Unit 3 in regards to the fish return rate from the screens. Recirculation of seaweed from all the screens to the "A" and "B" screens was occurring.

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### Analysis of Event

This event is being reported in accordance with 10CFR50.73(a)(2)(iv), any event or condition that resulted in manual actuation of an Engineered Safety Feature. Immediate notifications were performed in accordance with 10CFR50.72(b)(2)(ii).

The safety significance of the event was minimal in that the trip was manually initiated when a Turbine trip was imminent. While seaweed loadings were high, all equipment functioned as designed.

Operation of the Service Water system was not jeopardized due to the ratio of Service Water System flow (approximately 150,000 gallons per minute) to Circulating Water Pump flow (approximately, 150,000 gallons per minute) for one bay. When a circulating water pump trips, there is a reduction in flow resistance through the blocked screens. This allows differential level across the screens to return to normal after a period of cleaning with the reduced loading rate. There has never been any indication of reduction in Service Water System capacity or reliability after a trip related to blockage of the Traveling Screens.

A unit downpower, using the Rod Control and Steam Dump systems, was considered as potential corrective action during extreme weather conditions. The intent would be to reduce unit output below 50% power, where a turbine trip would not result in a reactor trip. Due to an interlock which prevents Steam Dump operation on loss of condenser vacuum, a power reduction below the Turbine Trip - Reactor Trip setpoint is not possible.

On the night prior to the trip, a Thermal Backwash of the Condenser was performed. As this causes one of the six Circulating Water Pumps to be out of service, a thorough review of the weather forecast was performed by the Shift Supervisor. The forecast was for a storm front to move through the area on the afternoon of May 6, 1989. The weather during the morning hours was projected to be stable. The front actually passed through at 0645 on May 6, 1989, as indicated by the peak wind velocity. Wind velocity was decreasing at the time of the trip.

All plant protection systems performed as designed in response to this occurrence and the event posed no danger to the health and safety of the public.

#### Corrective Action

The immediate corrective action was to clear the traveling screens, trash trough and fish return trough. A procedure change has been implemented which allows for the isolation of the fish spray system when seaweed recirculation is a concern.

Additional corrective action/action to prevent recurrence includes implementation of the recommendations of an internal task force reviewing the Intake Structure problems with seaweed fouling. The Task Force has completed its review and has made the following recommendations:

In the short term:

a) Develop procedures to provide operators with a "seaweed warning" and the actions to be taken. The alternating use of the fish return sprays with the trash trough sprays to allow for cleaning of the system will be proceduralized.

b) Improve the operation of the trash rake.

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#### V. Corrective Action (Continued)

In the long term:

c) Improve the trash rake efficiency,

d) Investigate the upgrade of the traveling screens, which could include increasing the screen speed and/or complete replacement of the screens.

e) Change the design of the fish return trough to eliminate the seaweed recirculation problem.

#### Additional Information

Licensee Event Reports (LER) number 86-035, 88-014 and 88-024 are similar in that a Reactor Trip due to a Turbine Trip Resulted when fouling of the Intake Screens caused Circulating Water Pumps to trip causing condenser vacuum to decrease.

There are significant differences between these LER's and the cause of this event. In LER 86-035 the Traveling Screens were intentionally taken out of service to implement a design change required for additional system reliability. In LER 88-014 the Screen Wash System was operating at reduced capacity while one of its two pumps was out of service for maintenance. LER 88-024 is similar to this event in that a unit trip occurred even though all plant equipment was operating without any failures.

The corrective actions for Licensee Event Reports 86-035 and 88-014 have been fully implemented. Corrective action for Licensee Event Report 88-024 is presently being implemented and will be completed by June 10, 1989. This corrective action, i.e., modification to the trash trough, was not a factor in this event.

Since a number of unit trips have occurred due to similar reasons, a Task Force was formed to examine the problems with the intake structure. The Task Force was composed of representatives of Engineering, Maintenance and Operations. The primary objective of the Task Force was to determine how to prevent plant trips due to the traveling screens clogging with seaweed. The Task Force looked at the existing design, operation and maintenance practices employed. All of the departments at the plant were interviewed along with the Northeast Utilities Environmental Laboratory and the original Architect Engineer of the plant. The Task Force made recommendations and developed an action plan to implement the recommendations. A phased implementation of the recommendations will take place over the next two years.

#### EIIS CODES

##### Systems Components

Circulating Water System - KE Pumps - P  
Traveling Water Screens - SCN  
Condenser - COND

NORTHEAST UTILITIES

The Connecticut Light And Power Company  
Western Massachusetts Electric Company  
Holyoke Water Power Company  
Northeast Utilities Service Company  
Northeast Nuclear Energy Company

General Offices Selden Street Berlin Connecticut

P.O. BOX 270  
HARTFORD, CONNECTICUT 06414-0270  
(203)665-5000

June 5, 1989  
MP-13166

Re : 10CFR50.73(a)(2)(iv)  
U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, D.C. 20555

Reference: Facility Operating License No. NPF-49  
Docket No. 50-423  
Licensee Event Report 89-008-00

Gentlemen:

This letter forwards Licensee Event Report 89-008-00 required to be submitted within thirty (30) days pursuant to 10CFR50.73(a)(2)(iv), any event or condition that resulted in manual actuation of the Reactor Protection System (RPS).

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

Stephen E. Scace  
Station Superintendent  
Millstone Nuclear Power Station

SES/BN:mo

Attachment: LER 89-008-00

cc: W. T. Russell, Region I Administrator

D. H. Jaffe, NRC Project Manager, Millstone Unit No. 3

W. J. Raymond, Senior Resident Inspector, Millstone Unit Nos. 1, 2 and 3

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